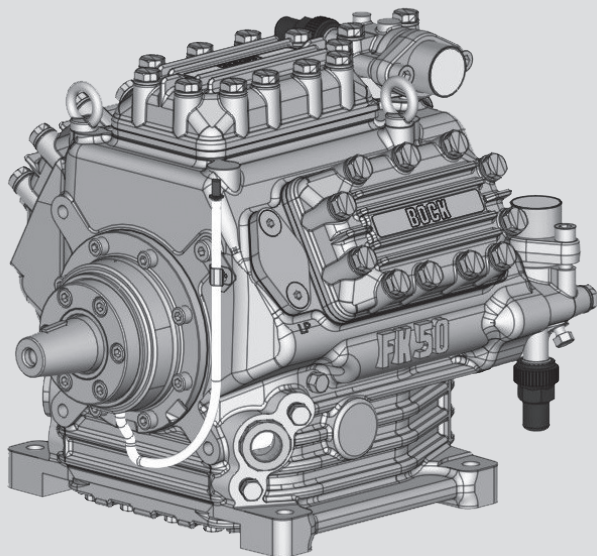




BOCK FK50

Maintenance manual

96003-01.2022-Gb

Translation of the original instructions

FK50/460 N
FK50/460 K
FK50/460 TK

FK50/555 N
FK50/555 K
FK50/555 TK

FK50/660 N
FK50/660 K
FK50/660 TK

FK50/775 N
FK50/775 K
FK50/775 TK

FK50/830 N
FK50/830 K

FK50/980 N
FK50/980 K

FKX50/460 N
FKX50/460 K
FKX50/460 TK

FKX50/555 N
FKX50/555 K
FKX50/555 TK

FKX50/660 N
FKX50/660 K
FKX50/660 TK

FKX50/775 N
FKX50/775 K
FKX50/775 TK

FKX50/830 N
FKX50/830 K

FKX50/980 N
FKX50/980 K

Foreword

Read these instructions before assembly and before using the compressor. This will avoid misunderstandings and prevent damage. Improper assembly and use of the compressor can result in serious or fatal injury.

Observe the safety instructions contained in these instructions.

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Liability and warranty

Liability and warranty

Manufacturer's liability and warranty are excluded if

- Alterations and functional modifications have been carried out
- No original replacement parts have been used

Introduction

Introduction

This maintenance manual is intended to make the repair and maintenance of the FK50 easier for the servicing personnel. The maintenance manual contains a complete description of each work step for the disassembly and assembly of the compressor components. Each step must be carefully adhered to in order to ensure a reliable repair.

Reminder:

- For replacing components Bock provides suitable spare part kits. Yet assembly jobs which go beyond the replacement of the shaft seal, the valve plates and - if there is one - the capacity regulator (accessory) should be checked carefully for their economic efficiency beforehand.
- The maintenance manual describes the standard type of the FK 40 compressor which we deliver. Because of different system conceptions, some passages in this service manual may differ from the unit which you have come across. In these cases the present manual should be used in analogous fashion.

Safety

Safety instructions

Target group of these instructions

- Work on the compressor may only be carried out by persons whose technical training, skills and experience along with their knowledge of pertinent regulations and documentation means that they are capable of assessing the work to be carried out and detecting any possible dangers
- Specialist can mean a refrigeration technician for example. Note that electrical work may only be carried out by a qualified electrician. Alternatively, on a country-specific basis, persons who have undergone electrotechnical instruction and who have proof of their qualification are also permitted to carry out the work.

Identification of safety instructions



DANGER

Indicates a dangerous situation which, if not avoided, will cause immediate fatal or serious injury.



DANGER

Indicates a dangerous situation which by electrical current, if not avoided, will cause immediate fatal or serious injury.



WARNING

Indicates a dangerous situation which, if not avoided, may cause fatal or serious injury



CAUTION

Indicates a dangerous situation which, if not avoided, may cause fairly severe or minor injury.



ATTENTION

Indicates a situation which, if not avoided, may cause property damage.



INFO

Important information / tips on simplifying work.

Safety

General safety instructions



GEFAHR

Danger from electric shock

Compressors contain live parts. Touching these parts can cause electric shock and lead to serious or even fatal injuries.

- Disconnect the compressor from the power supply before commencing work!
 - Turn the main switch of the plant to "0" (OFF)!
 - Secure the main switch to prevent restart!
 - Observe the instructions of the plant/vehicle manufacturer!
-



WARNUNG

Danger due to unqualified personnel

Work with or on the compressor by inadequately qualified personnel can cause serious, or even fatal, accidents and injuries.

- Only adequately qualified persons, such as refrigeration plant service technicians or refrigeration mechatronic engineers, are allowed to work on or with the compressor!
 - Generally, such persons must be able to assess and judge work and dangers with and on the compressor!
-



WARNUNG

Danger from malfunctions

If a compressor continues to be operated during extreme running noise and/or a sharp reduction in refrigerating capacity, there is the danger of further events occurring, such as the fracture of the housing wall. If people are standing in the immediate surroundings, there is the risk of severe injury or even death from flying parts.

- In the event of extreme running noise, switch off the compressor immediately!
 - If there is a sharp reduction in refrigerating capacity, switch off the compressor immediately!
 - Secure the compressor to prevent restart!
 - In such cases do not continue to operate the compressor under any circumstances!
-

Safety



WARNUNG

Danger from pressure

Compressors are pressurized machines containing very high pressures. They must therefore be handled with extreme caution and care. Serious and even fatal injuries can occur.

- The maximum permissible overpressure must not be exceeded, even for testing purposes!
 - Depressurize the compressor before carrying out any work on it!
 - Wear protective equipment, such as safety goggles or gloves!
-



WARNUNG

Danger from hot parts

Parts on the compressor can get hot. They present a burn hazard.

- Avoid contact with hot parts, such as discharge line valves!
 - Wear protective gloves if possible!
 - Allow hot parts to cool down sufficiently whenever the situation requires (during disassembly/installation for example)!
-



WARNUNG

Danger from refrigerant

Severe frostbite and skin damage can be caused if the skin comes into contact with the refrigerant.

- The skin must never be allowed to come into contact with refrigerants!
 - Wear safety equipment!
 - When handling refrigerants, observe their properties!
 - Observe the precautionary measures and specifications of the refrigerant manufacturer!
-

Product description

Product description

Series FK50 vehicle compressors are designed for mobile applications.

Short description

Three design variations are available for different areas of application:

- | | |
|--|---------------|
| > For air conditioning | the K Design |
| > For air conditioning or normal cooling | the N Design |
| > for deep freezing | the TK Design |

The differences are mostly associated with the valve plate version which is adapted to each application range where operational safety and efficiency are concerned.

More features:

- Compact 6-cylinder compressor in W design.
- Wear resistant and long-lasting engine.
- Six sizes as regards capacity.
- Aluminium light-weight construction.
- Crankshaft supported in roller bearings on both sides.
- Bidirectional lubricating oil pump with relief valve.
- Variable arrangement shut-off valves.
- Ideally equipped with valve plates for each application.
- Integrated pulsation damper for especially quiet running.

Nameplate (Example)

BOCK Bock GmbH, Benzstr. 7 72636 Frickenhausen, Germany		Nr.: AR12345A020	4
1	Typ: FKX50/775N		
2	$\dot{V}_{th}$: 67,6 m ³ /h bei n: 1450min ⁻¹		
3	p _{max} : ND(LP)/HD(HP)=19/28bar Öl: BOCK lub E55		5

1. Type of compressor
2. Volume baláye bei 1450 ¹/min
3. LP: max. tol. stand still pressure intake side
HP: max. tol. Derating pressure high pressure side

4. Serial number
5. Oil type filled in compressor by the manufacturer

} **note limits of application diagrams!**

Type code (Example)

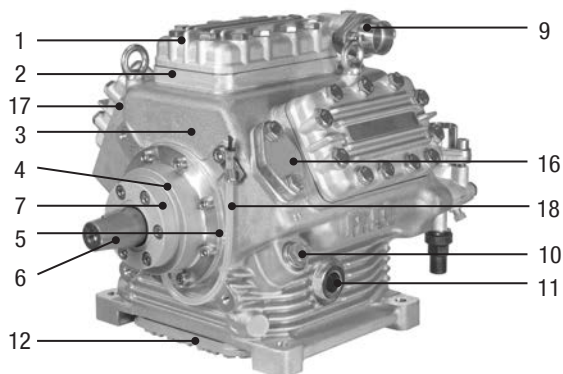
Explanation of the type designation

FK	X	50	/775	N
-----------	----------	-----------	-------------	----------

Application
Swept volume
Size
Ester-oil filling (HFKW refrigerant e.g. R134a, R407C)
Code letter for series

Product description

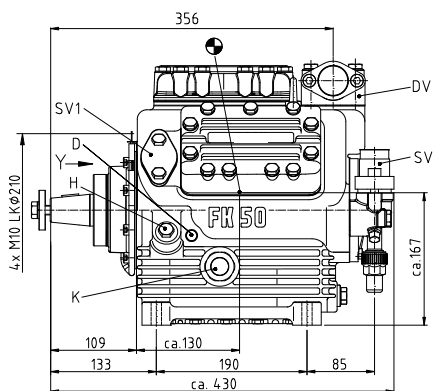
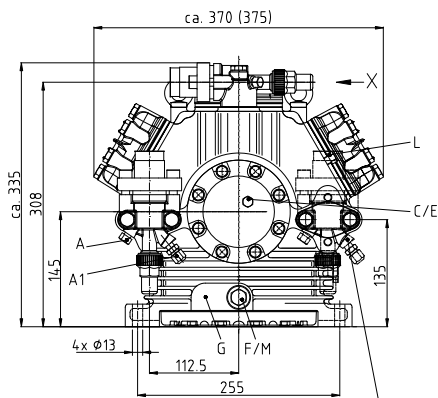
Main and functional parts



- | | |
|--|---------------------------------|
| 1. Cylinder cover | 12. Baseplate |
| 2. Valve plate | 13. Suction shut-off valve |
| 3. Compressor casing | (FK50/660, 775, 830 and 980 |
| 4. Integrated leak oil collector | with 2 suction shut-off valves) |
| 5. Location hole for fitting magnetic clutch | 14. Oil pump |
| 6. Shaft end | 15. Oil drain plug / oil filter |
| 7. Shaft seal | 16. Optional connection type |
| 8. Connection thermal protection thermostat | for suction shut-off valve |
| 9. Discharge shut-off valve | 17. Nameplate |
| 10. Oil filling plug | 18. Leak oil drain hose |
| 11. Sight glasses for oil (2x) | |

Product description

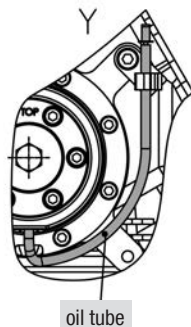
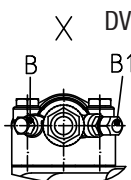
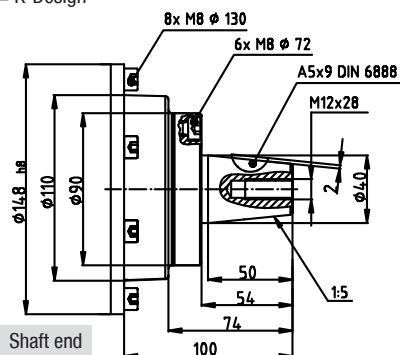
Dimension drawing



- additional SV at FK50/660, 775, 830 and 980 standart
- () = K-Design

Dimensions in mm

● Centre of gravity



Connections

A	Suction side connection, not lockable	1/8" NPTF
A1	Suction side connection, lockable	7/16" UNF
B	Discharge side connection, not lockable	1/8" NPTF
B1	Discharge side connection, lockable	7/16" UNF
C	Oil pressure safety switch connection OIL	1/8" NPTF
D	Oil pressure safety switch connection LP	1/8" NPTF
E	Oil pressure gauge connection	1/8" NPTF
F	Oil drain	M22 x 1.5
G	Optional connection oil sump heater ¹⁾	--
H	Oil charge plug	M22 x 1.5
K	Sight glass	2 x 1 1/8"-18 UNEF
L	Connection thermal protection thermostat	1/8" NPTF
M	Oil filter	M22 x 1.5
SV1	Optional connection suction valve	--

¹⁾ = Only possible from factory

Technical data

Type	Number of cyl.	Swept volume	Displ. volume (1450 1/min)	Weight	Connections		Oil filling	Inertia moment	Lubri- cation	Oil pump
					Discharge line DV	Suction line SV				
		cm³	m³/h	kg	mm / inch	mm / inch	Ltr.	[kgm²]		
FK50/460	6	459	40,1	44	28 / 1 1/8	35 / 1 3/8	2,6	0,0047	Forced feed lubrication	Independent of direction of rotation
FK50/555		556	48,3	43	28 / 1 1/8	35 / 1 3/8				
FK50/660		662	57,6	42	35 / 1 3/8	2 x 35 / 1 3/8				
FK50/775		776	67,6	41	35 / 1 3/8	2 x 35 / 1 3/8		0,0056		
FK50/830		831	72,3	43	35 / 1 3/8	2 x 35 / 1 3/8				
FK50/980		976	84,9	42	35 / 1 3/8	2 x 35 / 1 3/8				

The technical data are the same for the various design variants K, N and TK.
In the data concerning the type of compressor, these additions are not taken into account.

Maintenance

Maintenance

Service intervals

To ensure optimum operational reliability and service life of the compressor, carry out the service work required on the compressor at regular intervals as well as in accordance with the specifications of the refrigerating plant's manufacturer.

Regular checks (at least annually)

- Check the tightness of the compressor and of the plant
- Check the compressor for running noises and vibration development
- Check the oil level in the oil sight glass
- Check the oil fill level of the floating ring seal in the oil drain hose
- Drain the oil reservoir of the floating ring seal after 1,400 operating hours at the latest
- Check auxiliary devices, the capacity control for example, for proper function
- Check the pressures and temperatures of the plant
- Check tensioner pulley for correct seating
- Check tension and state of the V-belts
- Check fastening bolts for firm seating
- Check electrical connections for clean, firm contact and supply lines for chafe marks after 1,400 operating hours at the latest

Oil level check

After starting the compressor, the oil level has to be checked. For this:

- The driving engine should be in the „High idle“ operating condition (elevated idling speed)
- Compressor running time at least 10 min.
- The system should have reached the operating point and steady state.
- Check the oil level. Since in practice the installation position of the compressor can be different (inclined positions), it is recommended to check the oil level in both sight glasses. The oil level must be visible in at least one sight glass.

Oil change

Oil change: In principle, an oil change is not a mandatory requirement, if the equipment is correctly manufactured and properly operated. Based on decades of experience, we recommend however that the following oil change/service work is carried out:

- Initial oil change during the first maintenance of the vehicle (at the latest after one year)
- Then after every 5,000 operating hours, at the latest however after 3 years. Also clean the oil filter.
- An oil change is also necessary, if the oil is very cloudy and dark, or after repairs have been carried out on the compressor.

Where requirements are higher during use (frequent operation at the limits of application, or in hotlands with over +40 °C ambient temperature, or in the case of deep freezing), the following requirements must be observed:

- Initial oil change during the first maintenance of the vehicle (at the latest after one year)
- Then an oil change after every 2,000 operating hours, at the latest however after two years. Also clean the oil filter.

Maintenance

Preventive maintenance

The above requirements for higher use applications also apply in the case of preventive maintenance. The shaft seal must also be changed after 3 years.

Regular inspections (at least annually): Checks to be carried out on oil level in the oil sight glass, oil fill level of the shaft seal in the oil drain hose, absence of leaks in the compressor, running noise, vibrations, pressures, temperatures, and functioning of auxiliary devices such as the capacity control.

Emptying the shaft seal oil reservoir: As required depending on use, but at the latest after 1 year or approx. 1,400 operating hours. Since changing the shaft seal involves encroaching into the refrigerant circuit, this is only recommended, if the seal is losing refrigerant, or if oil is escaping in excess of the permissible amount. Changing the shaft seal is described in the relevant spare part kit.

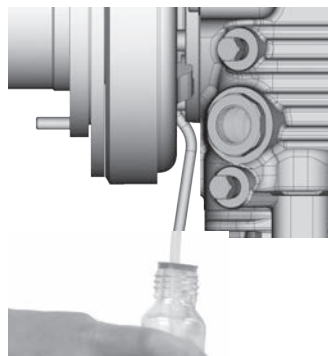
Emptying the oil reservoir

Emptying the oil reservoir: The oil reservoir can be emptied very simple without having to dismantle the coupling and/or belt drive. It is recommended that this is done at the same time as the air-conditioning maintenance and motor service. To proceed, detach the oil hose from the bracket, remove the sealing plug and drain the oil into a collecting vessel. After emptying, reseal the oil hose and clamp it into the bracket.

Dispose of the used oil in accordance with national regulations.

The shaft seal is a wearing part, and its service life depends on the prevailing conditions. Damaging effects on the shaft seal:

- Too little suction gas superheat, particularly during wet operation
- Too high or too low belt tension
- Thermal overload (operation outside the limits of application)
- Frequent cycling
- Long periods of stoppage
- Material deposits / dirt from the system



Due to these effects, the shaft seal can develop leaks, and it must then be replaced.

Maintenance

Recommended spare parts/accessories

Maintenance set for oil change

- **BOCK**lub E55 2 x 1 l
- Oil drain screw with seal

Maintenance set for shaft seal

- shaft seal kit
- **BOCK**lub E55 2 x 1 l
- Oil drain screw with seal

Available spare parts and accessories can be found on our compressor selection tool under **vap.bock.de** as well as in our online spare parts catalogue at **bockshop.bock.de**.

Only use original Bock spare parts!

Lubricants / Oils

The oil type filled as standard in the factory is marked on the name plate, and this should always be used, even in the case of maintenance units. Alternative oil types can vary significantly in quality due to additives or inferior raw materials by the manufacturer. Validation within the compressors entire operating limits can not be guaranteed, if such alternative oil types are used. It is for this reason, that we only recommend the use of oil from Bock! Bock assumes no liability for any damage arising from alternative oil types.

Refrigerant	Bock standard oil grade
HFC (e.g. R134a, R407, R 404A)	BOCK lub E55
HCFC (e.g. R22)	BOCK lub A46

Maintenance

Operating of the shut-off valves



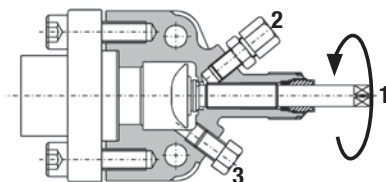
Note: Before opening or closing the shut-off valve, loosen the valve spindle seal (Fig. left) by 1/4 turn. After operating the shut-off valve, tighten the valve spindle seal carefully again (Fig. right).



Opening the shut-off valve

Spindle 1: Turn to the left (ccw) until the end stop.

-> Shut-off valve fully open / Service port 2 closed

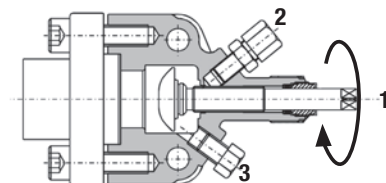


Opening the service port (2)

Spindle 1: Turn 1/2 -1 turn to the right

-> Service port 2 open / Shut-off valve open

Port 3 is intended for safety devices and cannot be shut-off.



Fault diagnosis

Fault diagnosis

In case of malfunctions during compressor operation we recommend to prepare a measurement record for aiding the fault search:

- Pressure measurement: Discharge side, suction side, oil pressure
- Temperature measurement: Compressor casing, discharge end temperature, suction gas overheating
- Oil level
- Compressor speed

According to the expected cause of the fault it may be necessary to check the electrical systems for faults in the control.

In order to localize the causes of operating malfunctions as easy as possible we have compiled the following table with suggestion for remedying compressor malfunctions. Further information is retrievable under vap.bock.de (mobile applications -> tools -> online analysis). Additionally a failure analysis slide is obtainable under service@bock.de.

Function faults - Symptoms

Function faults arising most frequently and their symptoms are:

- Compressor stoppage, compressor cutoff
 - Compressor does not start
 - Compressor starts and then stops again
- Refrigerant performance too low
- Too high compressor temperature
- Oil problems
- Abnormal compressor running noise

Compressor stand still

Compressor does not start

Problem	Possible cause	Remedy
Control circuit is interrupted / no control by control element	Main - or control fuse is switched off or tripped	Replace fuse Determine and remove the cause
	Cut off through: - Low pressure switch - High pressure switch - Heat protection thermostat - Control thermostat - Other safety elements	Locate the interruption in the circuit and remove the cause of interruption
Malfunction of electro-magnetic coupling	- see also page 20 "Malfunction of electromagnetic coupling"	Checking

Fault diagnosis

Compressor cutoff

Compressor starts and stops again

Problem	Possible cause	Remedy
Cutoff through low pressure switch	Suction pressure too low:	
	- Check the setting of the low pressure switch	- Adjust the switching points or replace switch
	- Suction valve of the compressor closed	- Open suction valve
	- Capacity of compressor too large	- Check operating conditions
	- Refrigerant deficiency	- Leak test / add refrigerant
	- Filter / dryer in the liquid line blocked	- Replace filter / dryer
	- Expansion valve not functioning properly	- Check the setting of the expansion valve
	- Solenoid valve on the liquid line not opening	- Check the control / function
	- Evaporator clogged (dirt / ice)	- Remove cause
	- Evaporator fan defective	- Remove cause
	- Pipeline damaged	- Remove cause
Cutoff through high pressure switch	Condensing pressure too high:	
	- Check the setting of the high-pressure switch	- Adjust the switching points or replace switch
	- Pressure valve of the compressor closed	- Open the pressure valve
	- Condenser fan not functioning	- Check the control / replace motor
	- Condenser performance insufficient, condenser and fan motor contaminated	- Cleaning of condenser fins and fan
	- Excessive refrigerant filling	- Extract refrigerant to normal filling
	- Non-condensable gases in refrigerant	- Extract refrigerant and evacuate the refrigeration plant / refill refrigerant
	- Pipeline damaged	- Checking and repairing the pipeline

Fault diagnosis

Cutoff through heat protection thermostat (accessory)	Discharge end temperatures is too high - Operating limits of compressor exceeded	- Adapt the operating conditions to the operating range
	- Suction gas overheating	- Check expansion valve / check insulation on the suction side
	- Condenser cooling insufficient	- Check fan motors / cleaning of condenser
	- Valve plate damage	- Replace valve plate
	- Internal decompression valve has opened	- Replace decompression valve -> Check compressor and refrigeration plant Determine and remove the cause for the inadmissible high pressure in the high-pressure side
Cutoff through control thermostat	Temperature over / below the desired range	Check operating points

Refrigerant performance too low

Problem	Possible cause	Remedy
Suction pressure too high	- Expansion valve not functioning properly	- Check expansion valve setting; replace valve, if necessary
	- Lack of compressor capacity	- Check the function of the compressor by evacuating to vacuum. Check function of capacity regulator (accessory)
	- Shortage of refrigerant	- Run leakage test / refill refrigerant
Suction pressure too low	- See „Cutoff through low-pressure switch“	- Checking
High-pressure too high	- See „Cutoff through high-pressure switch“	- Checking
High-pressure too low	- Condenser being cooled to much	- Adjust the control of condenser cooling
	- Lack of compressor capacity	- Check compressor / Check the functioning of capacity regulator

	- Pressure laminations of valve plate leaking	- Replace valve plate
	- By-pass between suction and discharge side	- Localize leak between the discharge and suction side and repair it
	- Lack of refrigerant	- Carry out leakage check / top up refrigerant
Power regulator activated	- Malfunction	- Check function
V-belt slips	- missing voltage	- Adjust voltage

Refrigerant performance too high

Problem	Possible cause	Remedy
Suction gas temperature too high	- Suction gas overheating	- Adjust expansion valve Insulate the gas suction line
	- Too little refrigerant filling	- Establish the operating filling (see Operating Instruction for the refrigeration plant), localize leak
	- Liquid filter blocked	- Clean / replace filter / dryer
	- Shortage of refrigerant	- Run leakage test / refill refrigerant
Discharge pipe temperature too high	- Suction gas temperature too high (Condensing pressure too high)	- Adjust expansion valve Insulate the gas suction line - see „Cutoff through high-pressure switch“
	- Operating limits of compressor exceeded	- see „Cutoff through heat-protection thermostat“
	- Cooling insufficient	- Check refrigerant filling - Adjust expansion valve
	- Short circuit between the discharge and the suction side of the compressor	- Check gaskets on valve plate / change
	- Valve plate damage	- Replace valve plate
	- Internal decompression valve has opened	- Replace decompression valve (see the section on Disassembly / Assembly of Compressor)

Fault diagnosis

Oil problems

Problem	Possible cause	Remedy
Oil pressure too low	- Refrigerant in oil	- see „Oil foams“
	- Too little oil in compressor	- Add oil and search for the cause of oil loss
	- Oil filter dirty / blocked	- Clean / replace oil filter Change oil
Oil foams during start-up phase	- Liquid refrigerant has moved into the oil sump	- Check the laying of pipes - Installation of the check valve in the discharge line / check - Installation of the solenoid valve in the liquid line / check - Check the control
Oil foams during operating	- Expansion valve not functioning	- Adjust / replace expansion valve / check
Oil level decreases	- During start-up, a portion of the oil is carried to the refrigeration plant with the refrigerant	- Refrigerant and oil get mixed. After some time the oil level should stabilize. Add oil, if necessary.
	- Refrigerant in oil	- see „Oil foams during start-up phase“
	- Piston rings worn	- Replace piston rings
	- Suction / discharge laminations of the valve plate leaking	- Replace valve plate
	- Oil return disturbed	- Remove cause
	- Lack of refrigerant	- Remove cause

Fault diagnosis

Abnormal running noise from compressor

Problem	Possible cause	Remedy
Fixation of compressor is loose	- Screwed connections have become loose - Securing elements for screwed connections missing	- Tighten the screwed connections and secure them anew
	- Vibration metals defective	- Replace vibrations metals
Liquid shock	- Liquid refrigerant reaching the compressor	- Adjust / check expansion valve Check refrigerant filling Check evaporator fan - Icing-up of the evaporator / Filter dirty
	- Oil shocks because of too much oil	- Check oil level Check the dimensioning of pipes (gas velocity) Replace worn piston rings
Capacity regulator (accessory)	- Switching on and off constantly / oscillating	- Check the control
	- Defective	- Replace capacity regulator valve
Electromagnetic coupling slipping	- see also p. 16 „Malfunction of electromagnetic coupling“	- Checking
V belt drive, increased noise generation	- Belts vibrating excessively	- Check belt tension Use tensioning roller / guidance roller
	- Incorrect alignment of compressor and motor	- Check alignment and adjust anew

Fault diagnosis

Malfunction of the electromagnetic coupling

Problem	Possible cause	Remedy
Coupling not switching	- No voltage applied	- Apply voltage and check
Coupling slipping too long, getting hot, smoking and squeaking	- Voltage too low	- Keep the voltage at 12 or 24 Volts (check vehicle network)
	- Driving power too high	- Check operating conditions
	- Rotor rubbing at the magnetic field	- Check the seating of the magnet possibly to high belt tension
Coupling not separating	- Voltage still being applied to the magnet	- Check switch / relay
	- Coupling is stuck	- Disconnect the armature disc from the rotor mechanically
	- Coupling overloaded, Armature disc is deformed	- Install new rotor and armature disc

Installation of service kits

Disassembly-Assembly of service kits



In principle, the same safety remarks described on page 5 of this Service Manual are valid.

Furthermore the following should be taken into account:

Before starting any work on the compressor:

- Switch of the machine and guard it against switching on.
- Close the discharge and suction shut-off valves.
- Relieve the compressor from system pressure.
- Use only genuine Bock spare parts.

After the work is finished:

- Connect the safety switch and check its function.
- Evacuate the compressor.
- Before commissioning, check whether all the components installed by the user have been mounted expertly and connected pressure-tight to the compressor (e.g. piping, plugs, union nuts, replaced components etc.
- Open the pressure and suction shut-off valves
- Set off the switching-on lock.

For changing components in the framework of customary service works we recommend the kits described on the following pages.

Installation of service kits

Shaft seal (Part No. 80023 (ester oil charge) resp. 80682 (mineral oil charge))

Removal:

- Dismount the drive/magnetic clutch from the compressor.
- Remove the woodruff key from seat at the shaft end.
- Remove the clamping ring (11) and the oil felt (10) (for this, see Fig. 3 on page 25).
- Unscrew the screws (9) from the shaft seal cover (6).
- Remove the gasket residues and the shaft seal cover gasket (5) from the bearing flange.



Attention: The shaft seal cover (6) is under spring tension. The remaining oil may run out of the shaft seal chamber. Keep a suitable collection container ready!

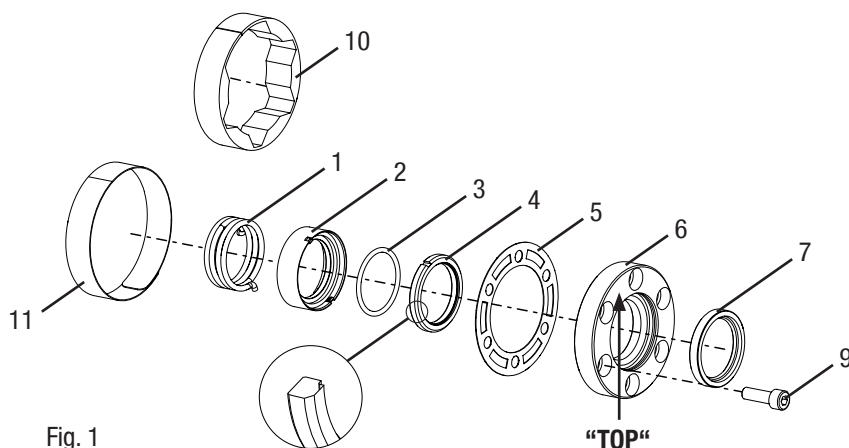


Fig. 1

Installation:

- Ensure the greatest possible cleanliness when working.
- Always replace floating ring seals in their entirety, not just individual parts.
- Avoid used parts.
- Before installation, check the sliding and sealing faces for cleanliness and/or damage.
- Push compression spring (1) over the crankshaft. Turn spring until drive lug engages in the crankshaft.
- Apply silicone grease to seat for O-ring joint in the guide ring (2) and O-ring joint (3).
- Push guide ring (2) with O-ring joint (3) and floating ring (4) over the crankshaft. Bevel on the floating ring facing outwards.
- Turn all parts until spring engages in the guide ring. Avoid scratches on the floating ring (4)!
- Apply silicone grease to shaft sealing ring (7) in the floating ring cover (6).
- Mount floating ring cover (6), incl. sealing ring (7) with seal (5), "TOP" marking must be on top, using centring sleeve.
- Press floating ring cover (6) onto bearing flange and tighten bolts.
- Turn crankshaft by hand, remove centring sleeve.
- Mount locking ring (11) with oil pad (10) (only to version ID 014, 4th quarter 2005), see section Locking ring with oil pad, chapter 7 Installation of service kits, P.25.
- Insert woodruff key in the groove of the compressor shaft end.
- Mount drive/coupling.

For graphic instructions on the floating ring seal, refer also to chapter 12/9 Installation of the floating ring seal, P. 56 f!

Installation of service kits

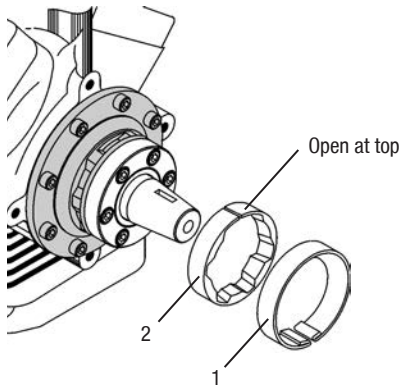
Emptying the oil reservoir / starting from Version ID 015 (starting from 4th quarter 2005)

Emptying the oil reservoir: The oil reservoir can be emptied very simply without having to dismantle the coupling and/or belt drive. It is recommended that this is done at the same time as the air-conditioning maintenance and motor service. Proceed by removing the oil hose from the bracket, remove the sealing plug and drain the oil into a collecting vessel. After emptying, close the oil hose with the sealing plug and fix it to the bracket. Dispose of used oil in accordance with the regulations applicable in the country of use.



Fig. 2

Version ID 007 - 014 (until th quarter 2005)



Clamping ring with oil felt (Part No. 80129)

Procedure:

- Remove the clamping ring (1) and the oil felt (2) (see Fig. 2)
- Insert the oil felt (2) included in the repair kit and mount the clamping ring.

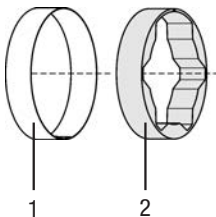


Fig. 1



Fig. 3

Installation of service kits

Capacity regulation

The capacity regulation takes place through the turning off of the suction gas flows by means of a solenoid valve on the cylinder cover. For this, the valve is activated electrically by a thermostat or pressostat.

- During normal operation the solenoid is de-energized and the suction gas channel in the valve plate and in the cylinder cover is open.
- During regulated operation the solenoid is energized and the suction gas flow is closed through the shut-off piston of the solenoid valve. The compressor pistons of the cylinder bank which is regulated down run idle. The capacity of the compressor is still approx. 50%.

Further information together the description of the working principle of the solenoid valve is contained in the publication „Capacity regulation“ (Part no. 09900).

Capacity regulation valve (Part No. 07541)

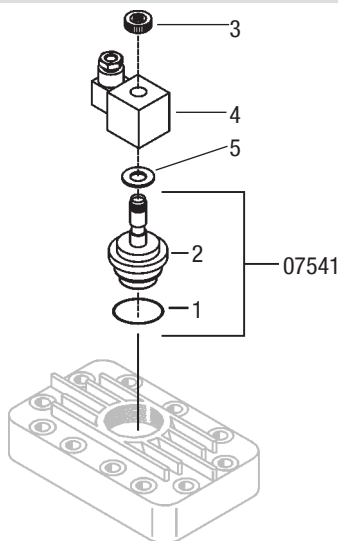
(Only for the capacity regulation which is an accessory)

Removal:

- De-energize the solenoid (4).
- Screw on the fixing nut (3), pull out the solenoid (4) with the washer (5).
- Unscrew the valve body (2).
- Check the valve body (2) for damages and whether the piston moves freely. If necessary, replace the complete valve body (2).

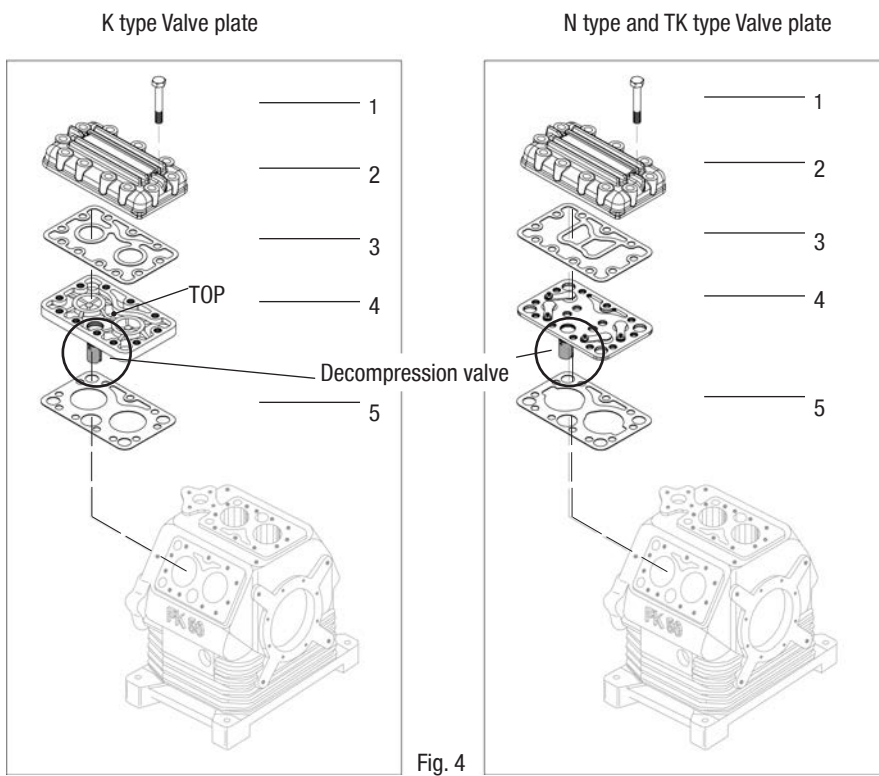
Installation:

- Screw on the valve body (2) with the enclosed new O-ring (1) and tighten it.
- Push on the washer (5) and the solenoid (4) and fasten them with the fixing nut (3).
- Put the compressor into operation and check the functioning if the capacity regulation.



Installation of service kits

Valve plate			
Compressor type	Parts kit (Part No.)	Compressor type	Parts kit (Part No.)
FK50/480 N	80243	FK50/460 TK	80243
FK50/555 N	80243	FK50/555 TK	80243
FK50/660 N to FK500/980 N	80244	FK50/660 TK	80244
FK50/460 N to FK50/980 K	08926	FK50/775 TK	80244



Installation of service kits

Removal (see Fig. 4):

- Unscrew the screws (1) from the cylinder cover (2) and dismount cylinder cover.
- Remove the gasket residues from the body of the compressor.



Reminder: Don't let any gasket residues fall into the compressor.

Installation (see Fig. 4):



Attention: The conversion of the compressor from one type of valve plate to another is not possible!

- Apply a little oil to the lower valve plate gasket (5) install the upper valve plate gasket (3) (metallic gasket) dry.
- Pay attention to the correct installation position of the gaskets (3, 5) of the valve plate (4) and of the cylinder cover (2).



Attention: Install the K type valve plate (Part no. 80010) only with the inscription „TOP“ facing upwards (see Fig. 6).

- Tighten the cylinder cover screws (Pos. 1 in Fig. 5) according to the sequence shown in Fig. 5 observe the screw tightening torque (see Table on Page 63)!

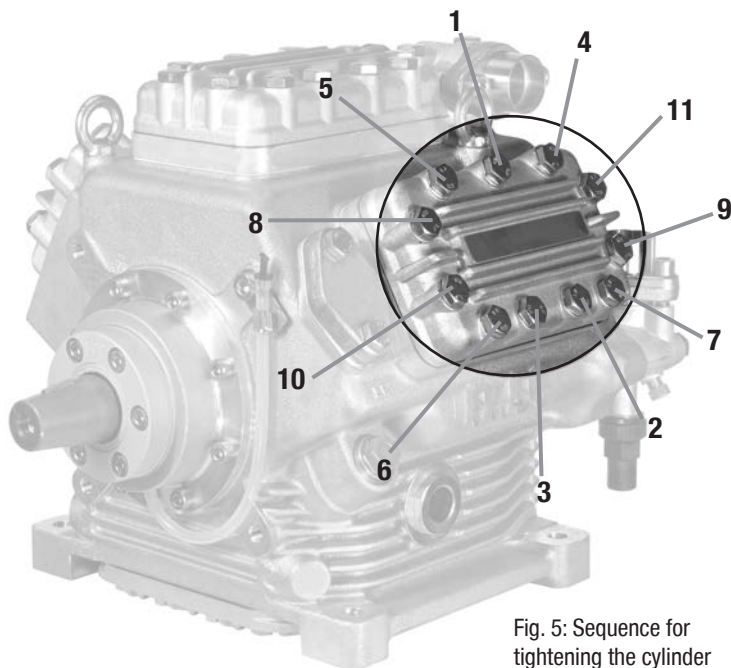


Fig. 5: Sequence for tightening the cylinder cover screws

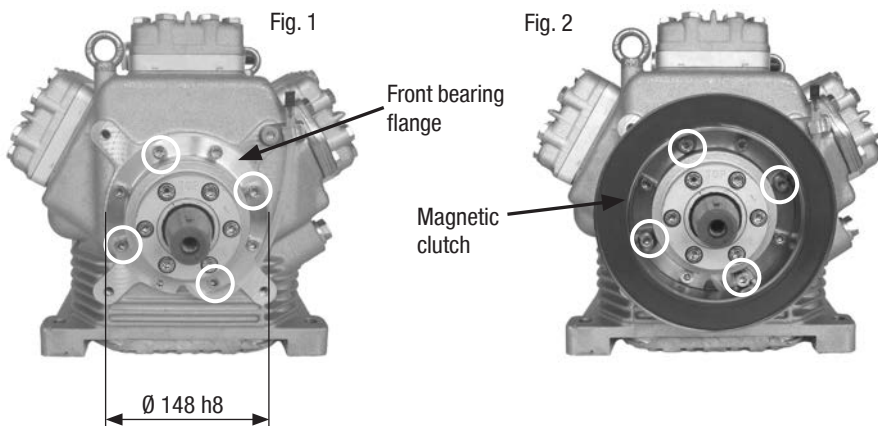
Electromagnetic clutch

Assembly instruction for electromagnetic clutch

For the drive of A/C compressors in buses, mainly electromagnetic clutches are used. The followings assembly instructions for clutch type LA 16 is representative for clutches which are mounted onto the front bearing flange of the compressor.

Assembly instruction for electromagnetic clutch Type LA 16 (Type LA 26 at FK50/830 and FK50/980)

- The front bearing flange has a location face $\varnothing 148$ h8 for fitting the solenoid of the electro-magnetic clutch (see Fig. 1).



- For fitting the solenoid (1) (Fig. 3, Page 30) remove the four M8x25 cylinder screws (2) (Fig. 3, Page 30) on the bearing flange (indicated with circles and arrows in Fig. 1 on page 29 and Fig. 2 on page 29).
- Fit the solenoid onto the location seat and fasten it again with the four M8 x 25 cylinder screws (Fig. 2). Observe the screw tightening torque (see Table on page 61)!



Attention! Use only M8x25 screws! Otherwise, serious damages may occur on the electromagnetic clutch and the compressor.

Electromagnetic clutch



Reminder: Arrange the cable (8) so that it doesn't touch hot parts (e.g. protection pipe). $t_{\max} = 105^{\circ}\text{C}$!

- Remove the K-circlip (5) and the clamping screw (4) from the rotor assembly (3). Looking through the rotor hole, pay attention to the correct seating of the Woodruff key in the rotor slot. It should be possible to turn the rotor by hand without the rotor touching the solenoid. Pay attention to the checking projection! Screw on the clamping screw (4) and tighten it. Screw tightening torque: 85 Nm. Install the K-circlip (5).
- Push the sheave (6) over the studs (9) and fasten it with zinc-coated M8 DIN 934-8 nuts (7).
- Connect the cable (8). The connection is polarity-independent. Voltage $\pm 10\%$ of nominal voltage.



Reminder for dismounting: For dismounting the clutch apply grease to the K-circlip and turn the clamping screw (4) to the left for unscrewing.



Attention! With all other methods of removal (pressing, hammering) there is risk of damage to the clutch.

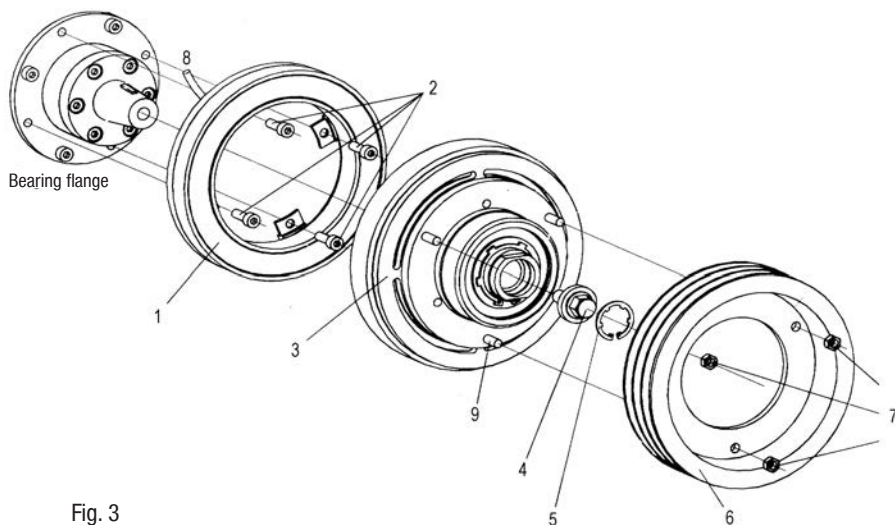


Fig. 3

Compressor defects

Compressor defects

Compressor defects may have various causes. The table below is meant to aid you while analysing the cause of the breakdown by means of the defective compressor parts found. Thus, the specific remedying of the cause of the breakdown is facilitated.

Compressor part	Possible causes / Symptom	Remedy
Valve plates	- Liquid shocks because of liquid refrigerant or oil	- see page 16 Abnormal running noise of the compressor - Check operating conditions
	- Overheating of compressor	- Check the operating conditions
Shaft seal leaking	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Standstill time too long	- Run the compressor for 10 minutes at least every 4 weeks.
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Too frequent starting of the compressor	- max. 12 compressor starts per hour
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions
	- Belt vibrating excessively	- correct belt tension
	- Alignment of compressor and motor incorrect	- check and adjust alignment
Oil pump	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions

Compressor defects

Compressor part	Possible causes / Symptom	Remedy
Bearings	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions
	- Overloading of compressor	- Compare the operating conditions with the application limits
Pistons / Connecting rods	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions
Copper plating	- Moisture in the system - Acid formation in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
Formation of oil-carbon	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions

Disassembly of the compressor

Removal of the compressor from the refrigerant system

a) Removal of the compressor from the system; shut-off valves remaining on the compressor

- Extract the refrigerant from the system into a container which may be used for this refrigerant.
- Evacuate the systems including the compressor.
- Cut off the vacuum, humid air should not get into the system.
- Close the shut-off valves on the suction and discharge side; remove the compressor.
- Close the suction and discharge line connection points on the system with stoppers.
- Relieve the pressure before dismounting the compressor.

b) Removal of the compressor from the system; shut-off valves for compressor remaining at the system

- Close shut-off valves on the suction and discharge side.
- Extract the refrigerant from the compressor into a container which may be used for this refrigerant.
- Evacuate the compressor.
- Cut off the vacuum.
- Remove the compressor from the system.
- Close the suction and discharge shut-off ports on the compressor with stoppers.

Disassembly of compressor

The disassembly of the compressor is explained in separate steps on the following pages. The indicated parts list positions refer to the spare parts lists, repair set lists, special accessories part lists and the exploded drawing at the end of the maintenance manual.



Preparation: Necessary tools

Reminder! For the removal and installation of the internal decompression valve the Bock special tool Part No. 09524 is necessary (only up to design key 015)!

Pos.	Tool	Size
1	Oil collection container	> 2,6 ltr.
2	Spanner	SW 10, 13, 14, 17, 19, 30, 36
3	Allen key	6 mm, 10 mm
4	Seeger circlip plier, Form C	8 - 13 mm
5	Pulling apparatus	
6	Pressing apparatus	
7	Piston ring plier	
8	Dial gage	
9	Bock special tool, Part No. 09524	



Reminder:

With compressors starting from year of construction 2008/09 the oil pump, the shut-off valves, the valve plate and the cylinder covers are bolted with washers. In the individual work sections separately with these washers does not deal. When assembling the washers must be used again on the installation!

Step 1	Removal of all shut-off valves and blind flanges Parts list position: 2060, 2070, 232 Tools: Spanner SW 17, allen key 6 mm
Pos. in parts list	Working course
220	• Unscrew the fixing screws of shut-off valves
330, 210	• Remove the shut-off valves and the gaskets
230 ,210	• Remove the suction filter and the gasket
233, 333	• Remove the screws from the blind flange
232, 231 232, 331	• Remove the blind flange and the seal

Fig. 11



Step 2	Removal of the oil filter Parts list position: 2130 Tools: Oil collection container, spanner SW 19, Allen key. 10 mm
Pos. in parts list	Working course
	• Drain the oil from the compressor into a suitable container • Unscrew the plug • Remove the gasket • Unscrew the oil filter

Fig. 12a

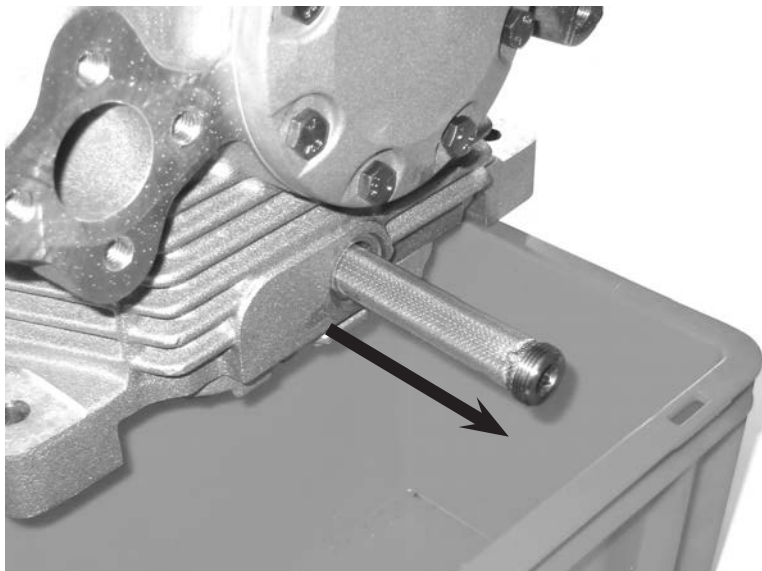


Fig. 12b



Step

3

Removal of the cylinder cover and valve plates

Parts list position: 170, 2000 (N / TK-versions), 1940, 2900 (K-version)

Tool: **Spanner SW 17**



In order to prevent any mix-up during reassembly, mark the cylinder cover and the valve plates belonging together clearly and in a wipe-resistant fashion!

Pos. in N / TK	parts list K	Working course
180	1950	• Unscrew the cylinder cover screw
170, 70	1940, 1930	• Remove the cylinder cover and the upper gasket of the valve plate
60, 50	1920, 1910	• Remove the valve plate and the lower gasket of the valve plate

Fig. 13a

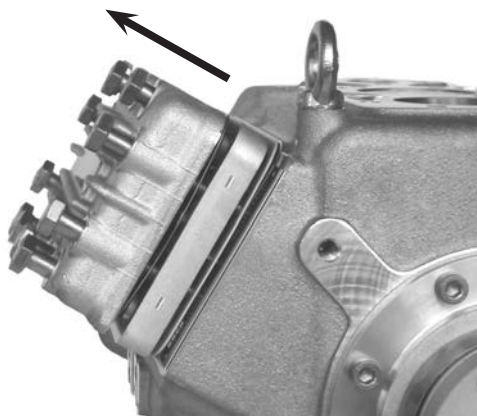


Fig. 13b



Step

4

Removal of the shaft seal

Parts list position: 2010

Tools: Oil collection container, Allen key 6 mm



For a detailed description see also the section on the removal of the shaft seal on page 19!

Pos. in parts list	Working course
2110	- Place the oil collection container under the shaft seal area - Remove the leak oil collection device from the bearing flange
750	- Unscrew the cylinder screws  Watch out! The shaft seal cover is under spring tension! It may jump out by itself.
2010	Remove the shaft seal cover, the guide ring, the O-ring and the spring.

Fig. 14a

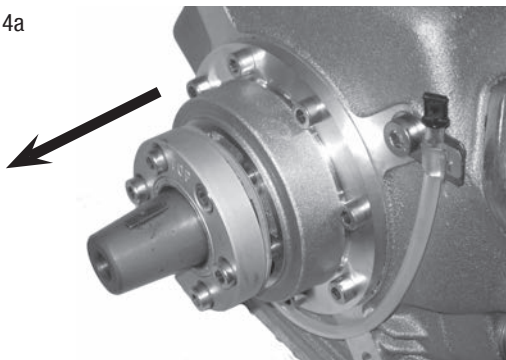
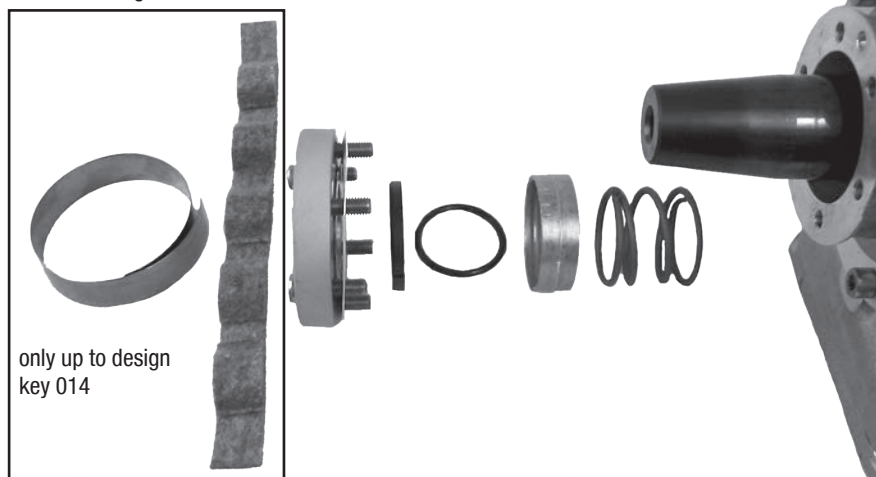


Fig. 14b



Step 5	Removal of the oil pump	
	Parts list position: 2020	
	Tools: Spanner SW 13	
Pos. in parts list	Working course	
40	• Unscrew the screws	
460, 470	• Remove the oil pump and gasket	

Fig. 15a

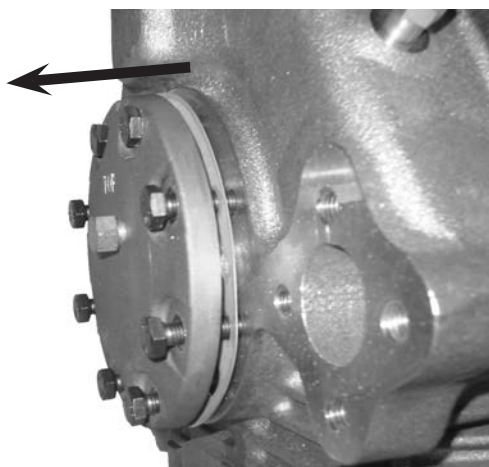
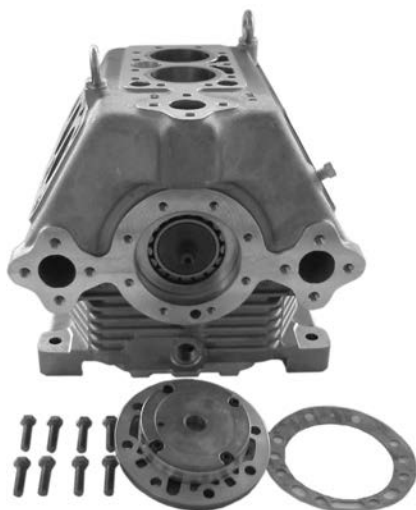


Fig. 15b



Step 6

Removal of the baseplate

Parts list position: **20**

Tools: **Oil collection pan, spanner SW 13**

Pos. in
parts list

Working course

40
20,30

- Place the compressor into the oil collection pan and turn it sideways
- Unscrew the screws from the baseplate
- Remove the baseplate and the gasket

Fig. 16a

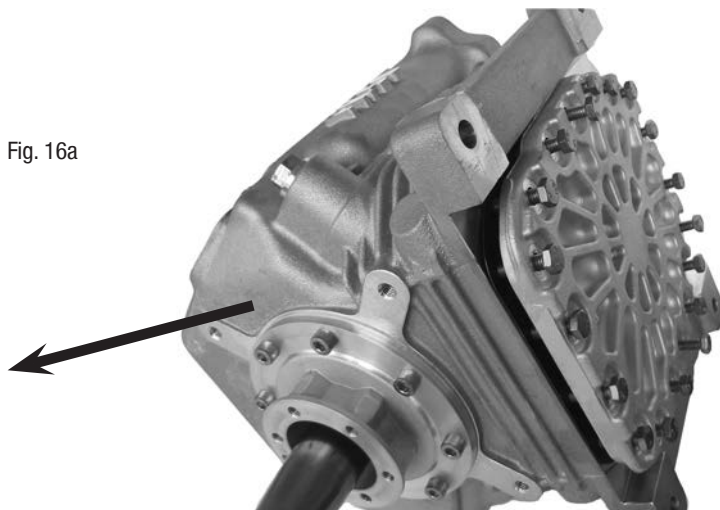


Fig. 16b



Step
7

Disassembly of the compressor rods from the crankshaft

Parts list position: **2100**

Tools: **Spanner SW 10**



In order to prevent any mix-up during reassembly, mark the connecting rods and caps belonging together clearly and in a wipe-resistant fashion.

Pos. in parts list	Working course
	• Unscrew the hexagon head screws from the connecting rod cap • Mark the connecting rod cap and remove it. • Push the piston and connecting rod upwards until the shop. • Remove the piston rings. • The same procedure should be applied for the remaining connecting rods

Fig. 17a

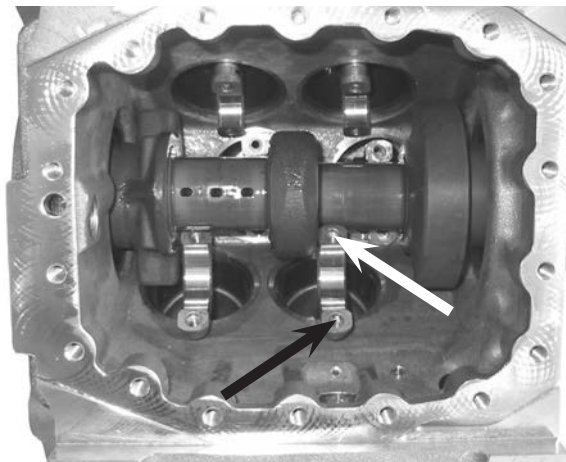
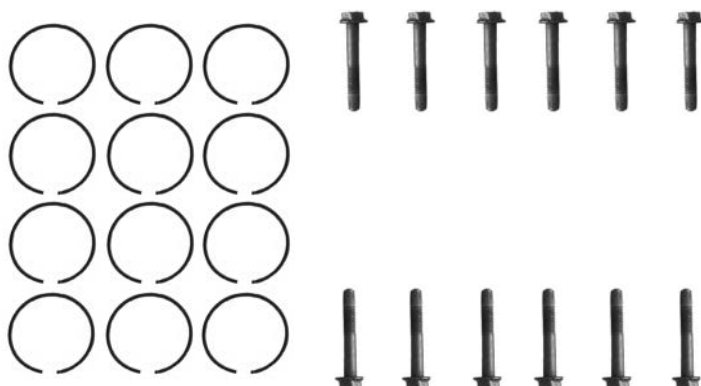


Fig. 17b



Step

8

Removal of the front bearing

Parts list position: **2140**

Tools: **Allen key 6 mm**

Pos. in parts list	Working course
750	• Unscrew the screws
730, 740, 745	• Remove the front bearing flange, gasket, and O-ring

Fig. 18a

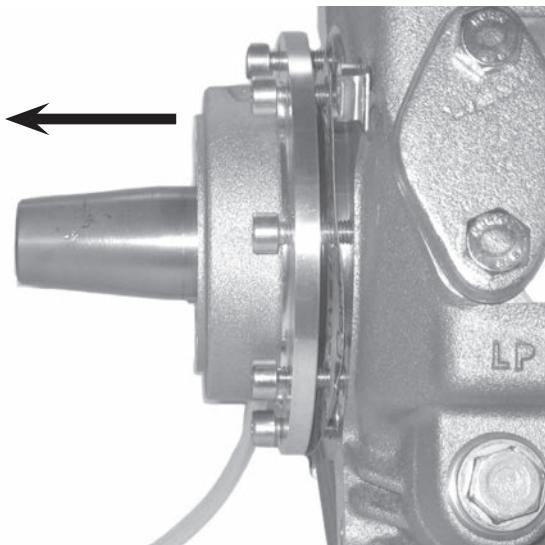
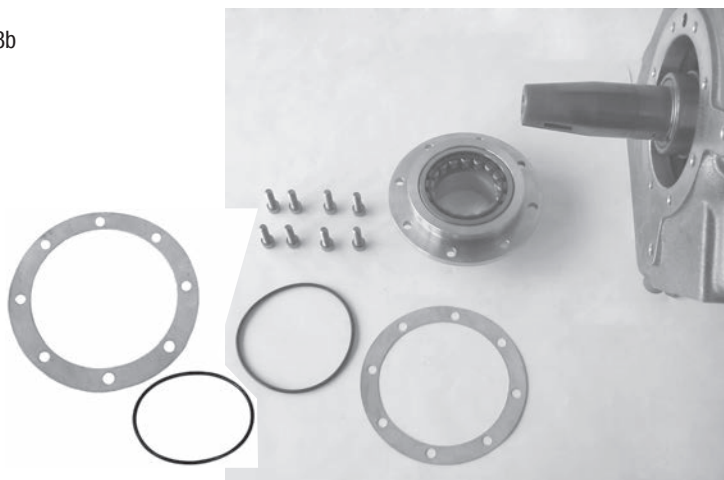


Fig. 18b



Step 9	Removal of the crankshaft
	Parts list position: 2050
	Tools: —
Pos. in parts list	Working course
	• Pull out the crankshaft carefully in direction of the front bearing flange.

Fig. 19a

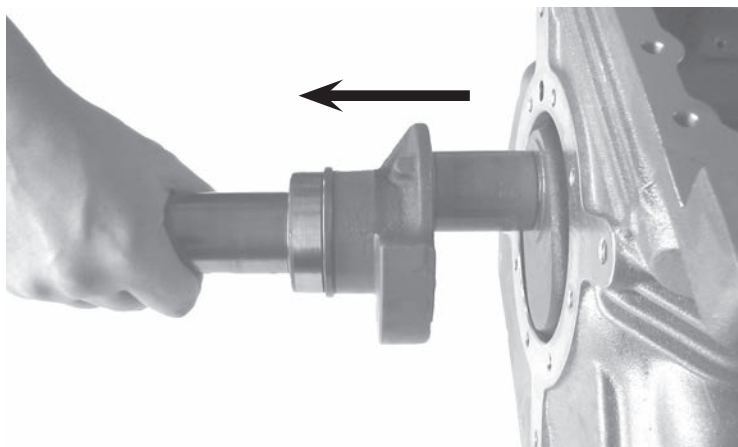
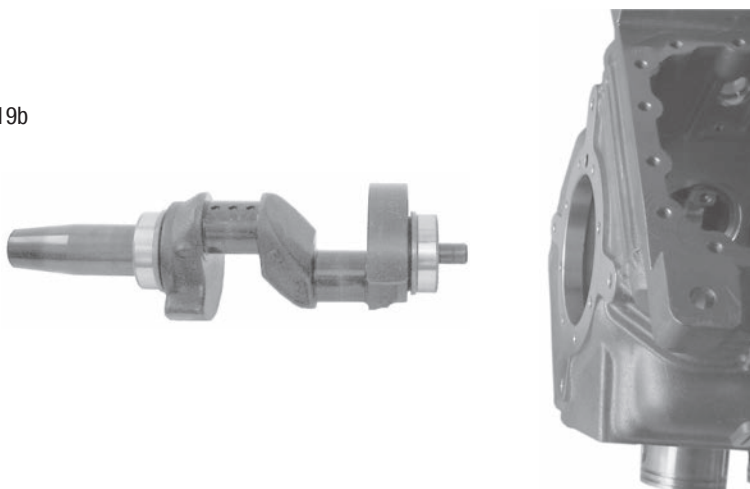


Fig. 19b



Step

10

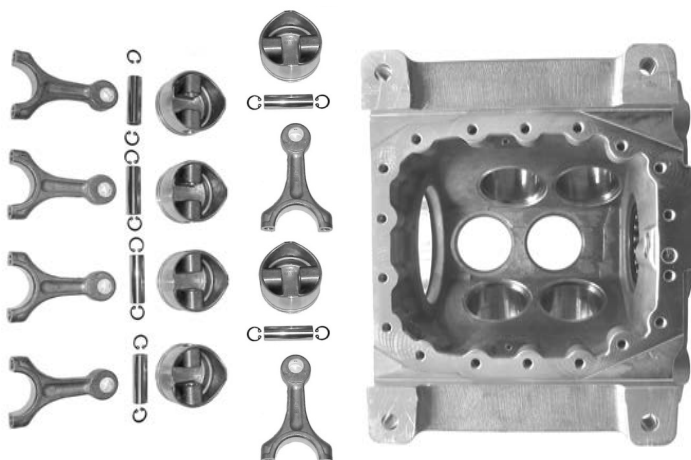
Removal of the pistons and connecting rodsParts list position: **2040 opt. 2045**Tools: **Seeger circlip plier from C 8-13 mm**

Pos. in parts list	Working course
	• Mark the piston and the cylinder bore belonging together. • Remove the piston / connecting rod in direction of baseplate.
280	• Remove the seeger circlip of the piston pins.
270	• Push the piston pins out of the pistons and remove pistons. • In order to prevent mix-ups, fasten the connecting rod caps to the connecting rods again.

Fig. 20a



Fig. 20b



Step

11

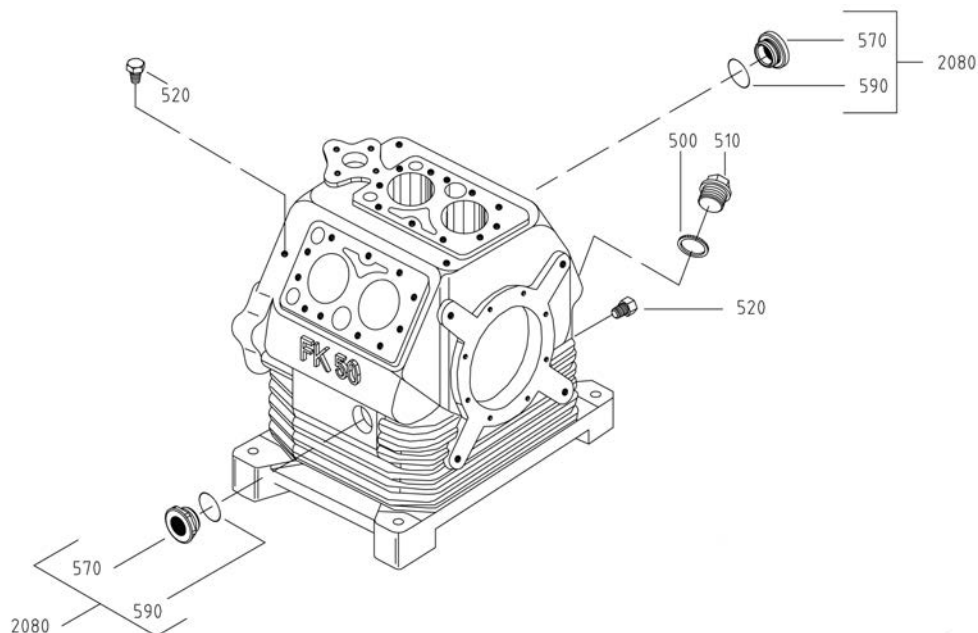
Removal of the remaining parts

Parts list position: —

Tools: **Spanner SW 13, 14, 30 o. 36**

Pos. in parts list	Working course
570	● Dismount the sight glass (use 30 mm or 36 mm spanner according to the type)
590	● Remove O-ring
520	● Remove the 1/8" NPTF plugs
510, 500	● Remove the plug M22 x 1,5 with the seal

Fig. 21



Step	Removal of the roller bearings
12	Parts list position: 2150
	Tools: Pulling apparatus
Pos. in parts list	Working course
2150, 730	• With the pulling apparatus pull out the roller bearing from the front bearing flange. ❗ Use oil, if necessary! If a pulling apparatus is not available, the front bearing flange may be heated for approx. 15 minutes in a pre-heated (220°C) baking oven. Afterwards the roller bearing can be pressed out by hand. ⚠ WATCH OUT! Parts are hot! Use protective gloves!
2150	• Press out the roller bearing from the compressor body.
312	• Take out the tolerance ring, if there is any. ❗ Use oil, if necessary!

Fig. 22a

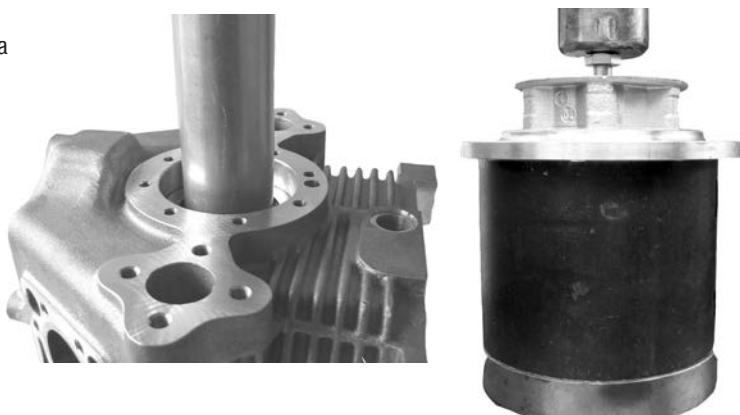


Fig. 22b



Checking the compressor parts

Checking compressor parts for damages / wear

- **Cylinder liners**

The cylinder liners should not have any visible damages in the piston movement area. If there is fluting, the casing should be replaced.

- **Crankshaft**

The bearing surfaces should not have any damages. The oil channels should be clean so that an unhindered oil flow is ensured.

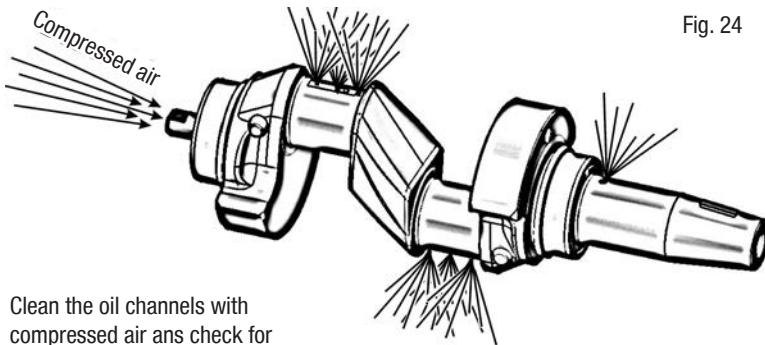


Fig. 24

Clean the oil channels with compressed air and check for passage

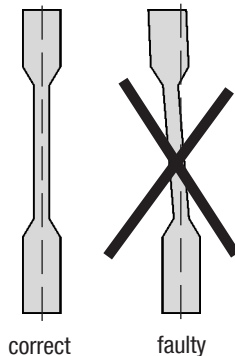
- **Pistons**

There should be no visible damages on the piston crown and the piston walls. The grooves for the piston rings must be clean and undamaged. Check the condition of the piston rings for wear, fractures and other irregularities.

- **Connecting rods**

There should be no damages on bearing surfaces. The connecting rod shank must be straight.

Fig. 25



Check the compressor parts

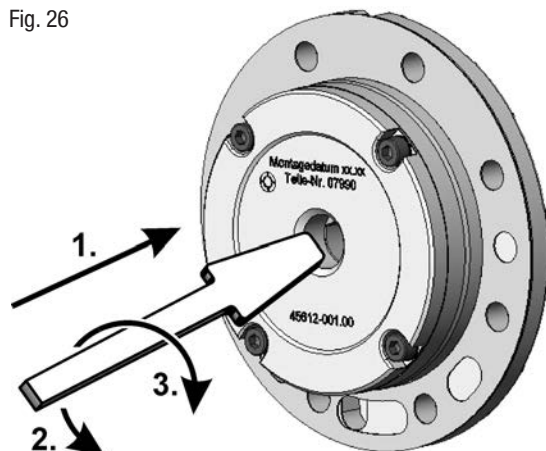
- **Valve plates**

Suction and pressure lamella must be undamaged and un-deformed. The sealing surfaces must be clean and undamaged. In case of a damage the valve plate must be replaced completely. Single lamella are not available.

- **Oil pump**

It must be possible to turn the oil pump by hand (turning to the left and to the right).
In the removed conditioning the reversing device of the oil pump must switch over audibly.

Fig. 26



Check the compressor parts

- **Oil filter / suction filter**

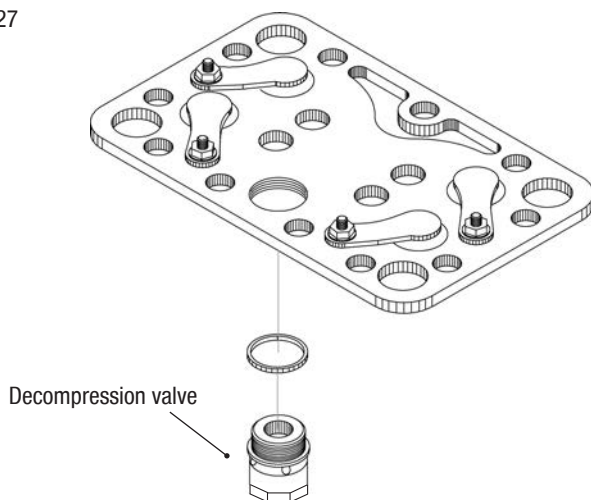
The filter screen must be in an undamaged condition. Dirt and residues have to be removed. If necessary, the filter have to be cleaned with compressed air or replaced with new ones.

- **Internal decompression valve (use Bock special tool, Part No. 09524 up to A015*, socket wrench SW 22 from A 017*)**

The internal decompression valve must be replaced after it has operated.

*) see on the last four pages of the machine number

Fig. 27



In case of larger compressor damages which necessitate a complete disassembly of the compressor, we recommend in principle the replacement of the following assemblies:

- Valve plates
- Piston rings
- Shaft seals
- Roller bearings

Thus, concealed defects of parts which have been in operation may be prevented.

Assembly of compressor

Step 1	Fitting the roller bearings
	Parts list position: 310
	Tools: Pressing apparatus
Pos. in parts list	Working course
	● Heat the bearing flange / compressor casing for approx. 20 minutes in a pre-heated (120°C) baking oven. ● Press the roller bearings onto the compressor casing and the front bearing flange. ⚠ WATCH OUT! Parts are hot! Use protective gloves! i Use tolerance ring if the bearing seat has a groove!



Fig. 28a

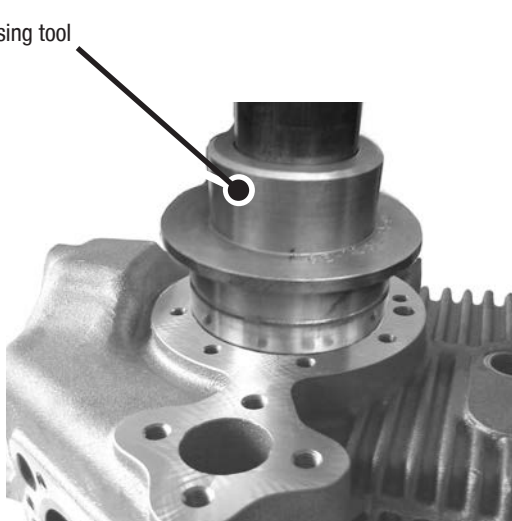


Fig. 28b

Step

2

Fitting the sight glass, plugs, decompression valve

Parts list position: —

Tools: **Spanner SW 13, 14, 30 o. 36**



Observe the screw tightening torques (see table on page 55)!

Pos. in parts list	Working course
570, 590	● Screw on the sight glass with oiled O-ring to the compressor body.
520	● Screw on the 1/8" NPTF plugs.
500, 510	● Remove the plug M22 x 1,5 with the seal

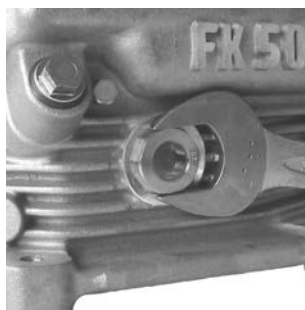


Fig. 29a



Fig. 29b

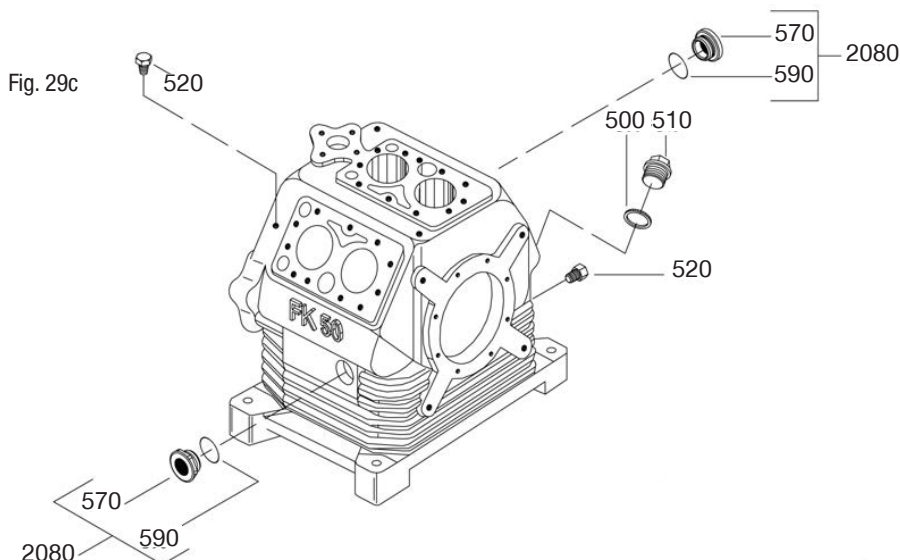


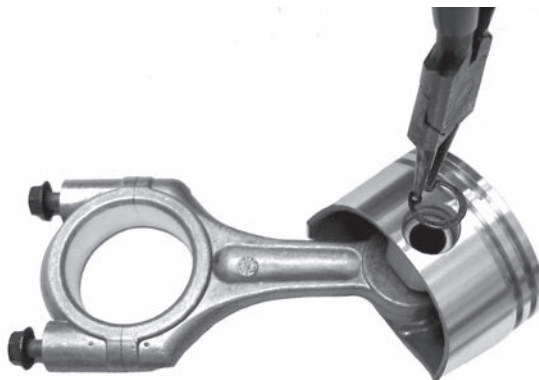
Fig. 29c

Step 3	Assembly of the pistons / connection Parts list position: 2040 opt. 2045 Tools: Seeger circlip plier Form C 8-13 mm
Pos. in parts list	Work course
270 280	● Assembly the pistons with the connecting rods (in the reverse sequence of the disassembly of compressor, step 7) ● Insert the piston pins; use oil, if necessary. (see. Fig. 30a). ● Install seeger circlips on both sides of the piston pins (see. Fig. 30b).

Fig. 30a



Fig. 30b



Step 4

Fitting the piston / connecting rod set

Parts list position: **2040 opt. 2045**

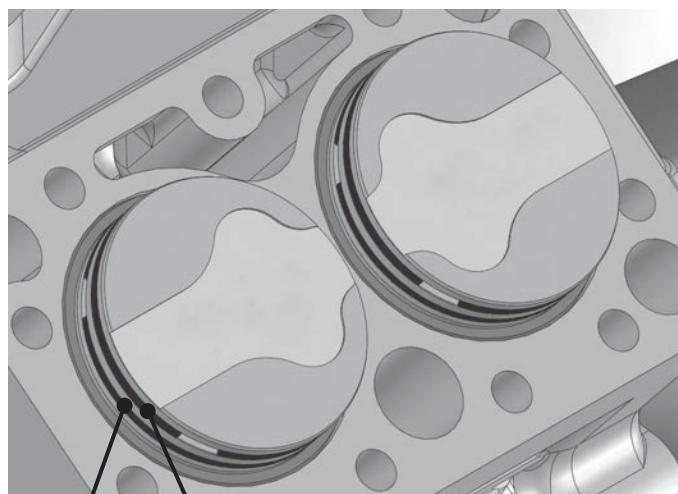
Tools: **Spanner SW 10**



Take the markings of each part into account (see disassembly, step 7 on page 33)

Pos. in parts list	Working course
2100	- Remove the connecting rod cap from the preassembled connecting rod assembly and mark it. - Apply a little oil to the cylinder bore.
2040, 2045	Insert the piston / connecting rod assemblies from the opening in the baseplate into the cylinder liners. i In the case of TK compressors pay attention to the correct assembly position of the pistons (suction fin grooves, Fig. 31)!
290, 300	Install the oil scraper rings and the compression rings of the pistons, afterwards turn them by 30°. i The butt joints may not lying upon each other (Fig. 31) Fit with the marking "TOP" facing upwards!

Fig. 31



Oil scraper ring

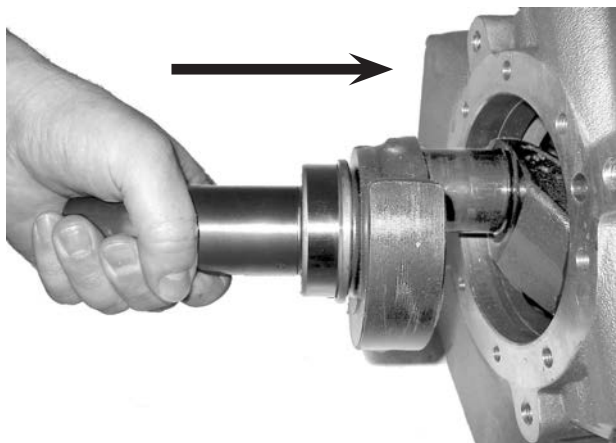


Compression ring



Step 5	Fitting the crankshaft
	Parts list position: 2050
	Tools: —
Pos. in parts list	Working course
	• Fit the crankshaft so that the drive journal engages into the gump gear.

Fig. 32



Step

6

Installation of the front bearing flange

Parts list position: **2140**

Tools: **Allen key 6 mm**



Observe the tightening torques (see table on page 55)!

Pos. in
parts list

Working course

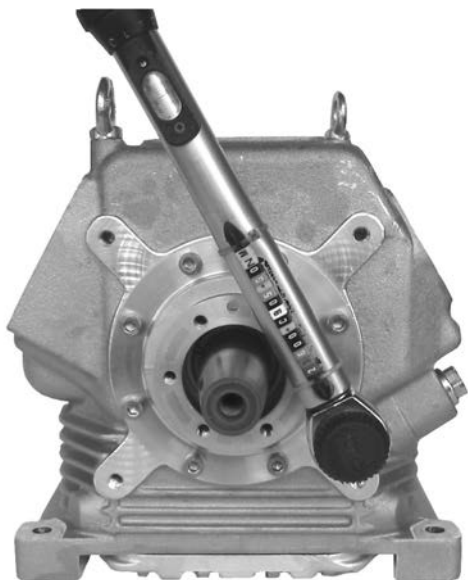
745

730, 740

750

- Apply oil to the O-ring and place it into the groove in the bearing flange.
- Install the front bearing flange with oiled gasket to the body so that the hole for the clamping ring faces upwards.
- Tighten the screws.

Fig. 33



Step 7

Assembly of the inserted connecting rods / pistons

Parts list position: 2040 opt. 2045

Tools: Piston ring plier, spanner 10 mm



Pay attention to the correct pairing of connecting rods and connecting rod caps!
Replace connecting rod cap screws or in the case of reusing put on a sticker!
Observe the tightening torques (see table on page 55)!

Pos. in parts list	Working course
290, 300	Compress the oil scraper ring and compression ring with the piston ring plier and insert the piston into the cylinder liner.
2100	- Place the marked connecting rod caps onto the related connecting rods. - Screw on the connecting rod caps and tighten. - Turn the crankshaft by hand. In case the crankshaft does not rotate freely check the seating of the connecting rods; if necessary, disassemble the connecting rods and carry out this step once more.

Fig. 34a



Fig. 34b



Step

8

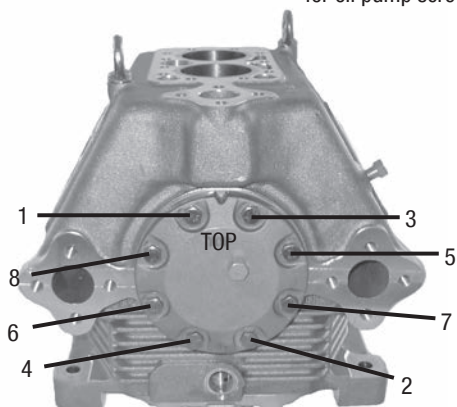
Install the oil pumpParts list position: **2020**Tools: **Spanner 13 mm****Observe the tightening torques (see table on page 55)!**

Pos. in parts list	Working course
460, 470	Install the oil pump with oil gasket into the body with the inscription „TOP“ facing upwards.
40	(i) Pay attention to the position of the holes in the gasket (Fig. 35a)! - Tighten the oil pump screws crosswise - Pay attention to the tightening sequence of the oil pump screws (Fig. 35b)!

Fig. 35a



Fig. 35b

Tightening sequence
for oil pump screws**Adjust end play!**

The end play of the crankshaft should be minimum 0,1 mm. When parts of the driving unit of the compressor have been repaired or replaced, an accurate measurement of the end play is necessary. The measurement has to be at the disassembly friction ring cover. Will the play of the crankshaft be **less than 0,15 mm**, the bearing flange has to be disassembled and a second seal has to be inserted (Fig. 35d).

Fig. 35c

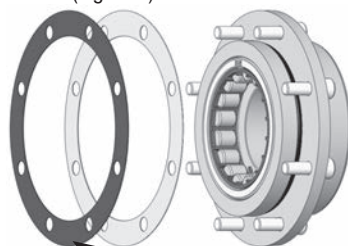
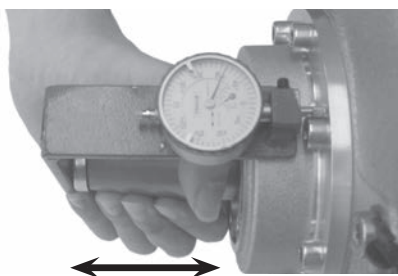


Fig. 35d second seal

Step

9

Fitting the shaft seal

Parts list position: 2010

Tools: Allen key 6 mm



Watch out! Avoid damages! Pay attention to the markings! Apply a little oil to the parts! Observe tightening torques (see table on page 55)!

Pos. in parts list	Working course
	• Push the compression spring onto the crankshaft. Rotate the spring until the driving catch is engaged in the crankshaft. • Push the guide ring with O-ring and sliding ring onto the crankshaft. Rotate all parts until the spring is engaged in the guide ring. Avoid scratches on the sliding ring!
880	• Install the shaft seal cover with the gasket. The inscription „TOP“ must be at the top.
750	• Press the shaft seal cover onto the bearing flange and tighten the screws.
	• Turn the crankshaft by hand (it now moves with a little more difficulty).
2110	• Install the clamping ring (only up to design key 014, Fig. 36 c and d) and see also under service-kits: clamping ring with oil felt.

Fig. 36a



Fig. 36b

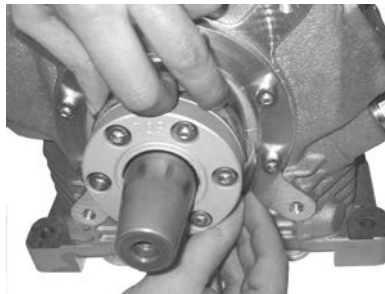
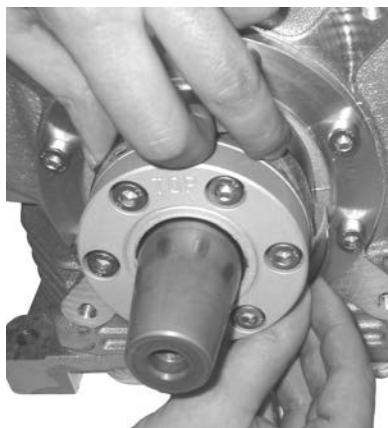


Fig. 36c



Fig. 36d



Step

10

Installation of the baseplate

Parts list position: 20

Tools: Spanner 13 mm



Observe the tightening torques (see table on page 55)!

Pos. in parts list	Working course
20, 30, 40	Install the baseplate with gasket and tighten the M8x30 screws. Pay attention to the tightening sequence of the baseplate screws!

Fig. 37a

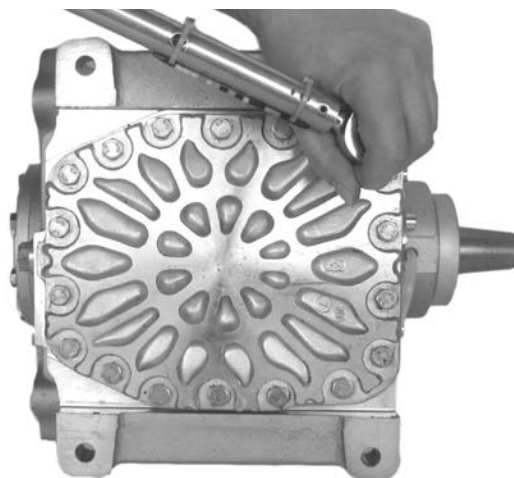
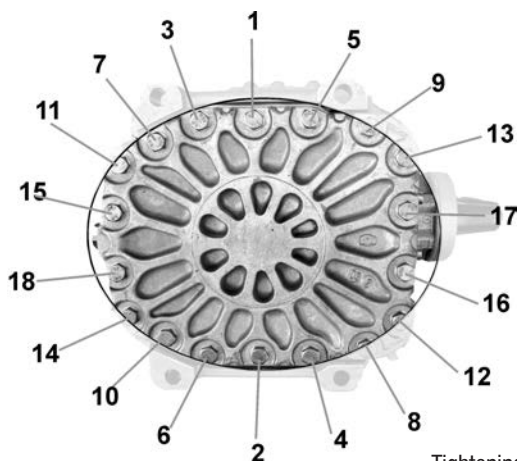


Fig. 37b



Tightening sequence of baseplate screws

Step

11

Installation of the oil filter

Parts list position: 2130

Tools: Allen key 10 mm, Spanner SW 19



Observe the tightening torques (see table on page 55)!

Pos. in parts list	Working course
490	• With the allen key, screw on the filter into the hole in the body and tighten it.
500	• Install gasket.
510	• Screw on the M22 x 1.5 mm plug and tighten it.

Fig. 38a

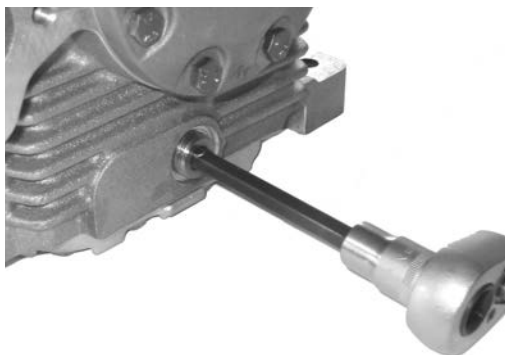
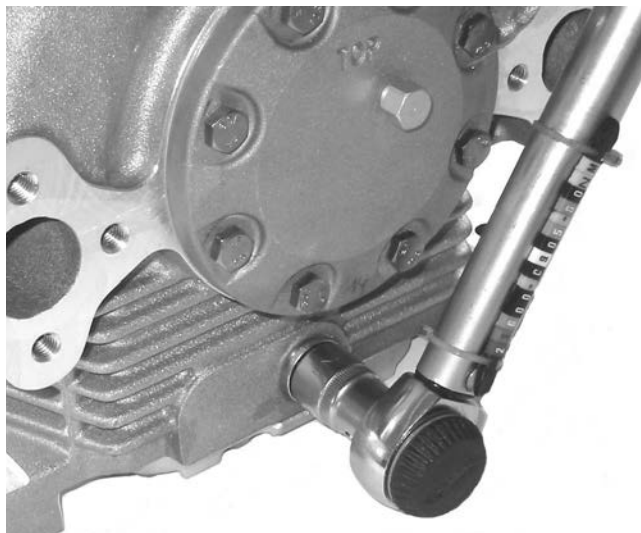


Fig. 38b



Installation of the cylinder covers and valve plates

Parts list position: 170, 2000 (N / TK versions), 1940, 2900 (K versions)

Tools: Spanner 17 mm



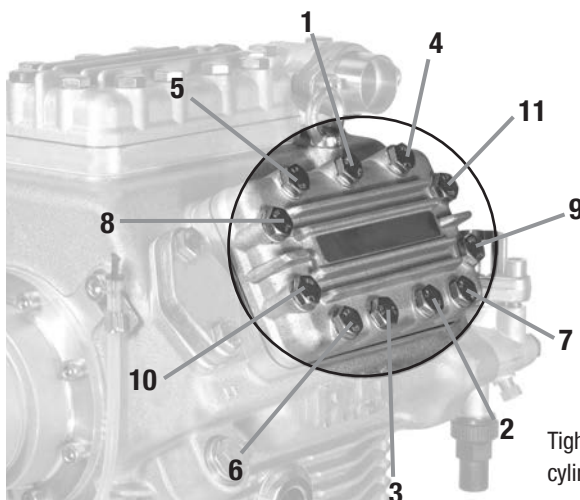
Install only the cylinder covers and valve plates which belong together, avoid mix-ups! Observe the tightening torques (see table on page 55)!

Pos. in N / TK	parts list K	Working course
60, 50 70, 170	1920, 1910 1930, 1940	See page 21-22 - Mount the valve plate with the lower valve plate gasket onto the body. - Mount the cylinder cover with the upper valve plate gasket (see Fig. 39a)
180	1950	(i) Mount the K type plate with the marking „TOP“ facing upwards! Tighten the screw cross-wise in at least two steps. Pay attention to the tightening sequence of the cylinder cover screws! (see Fig. 39b)

Fig. 39a



Fig. 39b



Tightening sequence for
cylinder cover screws

Step

13

Installation of the shut-off valves and blind flanges

Parts list position: 2060, 2070, 232

Tools: Spanner 17 mm



Apply oil gaskets; observe tightening torques (see table on page 55)!
Use screws of correct length for the installation of the intermediate flanges!

Pos. in parts list	Working course
230, 210 220, 210	● Put in the suction filter with the gasket. ● Install the shut-off valves (on the discharge and suction side) with gaskets and screws.
232, 231	(i) If there is an intermediate flange: Use screws of correct length. ● Install the blind flange with seals and screws. ● Tighten all screws; observe tightening torques!

Fig. 40a

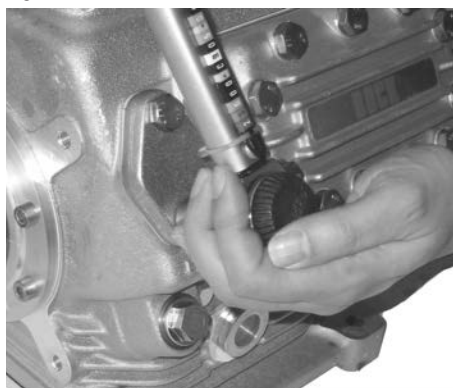


Fig. 40b



Fig. 40c

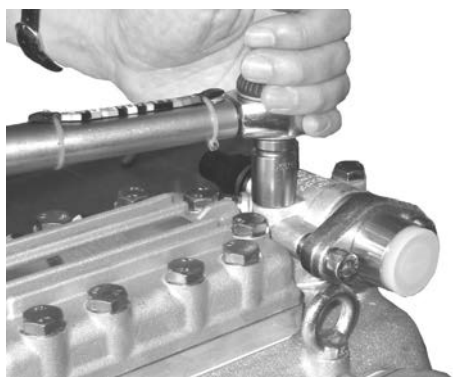
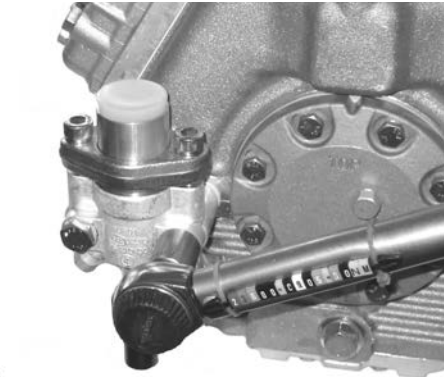


Fig. 40d



Checking the compressor

Working course

1. Evacuation / leak check of compressor

- Connect the discharge and suction sides of the compressor to a vacuum pump.
- Evacuate the compressor from both sides; vacuum < 1,5 mbar. Check increase in pressure.
- In case there is an increase in pressure, check the compressor for leaks and evacuate again.
- Fill in the stipulated amount of oil (2,6 liters).

2. Carrying out the function test

- Install the compressor in the system.
- Carry out a leak test with refrigerant.
- Make a test run. During this, check the oil level, the leak-tightness of the compressor, the running noise, pressure, temperatures and the functioning of additional devices such as the capacity regulation.

Remark: If the compressor is going to remain in the warehouse, charge it with nitrogen (at about 3 bar pressure) for protection.



Attention! Take the reminders for commissioning in the operating manual for FK50 into account!

Tightening torques for screwed fastenings

General fastenings with fibrous or metallic flat gasket

Screw size	Tightening torque
M8	34 Nm
M10	60 Nm

Reminder: Cylinder cover / valve plate: Tighten the screws cross-wise in at least two steps (50 / 100 % of the tightening torque).

Special fastenings

Designation	Thread size	Tightening torque
Shaft seal cover	M8	34 Nm
Connecting rod screw	M6	15 Nm
Oil filling plug	M22 x 1,5 ¹⁾	60 Nm
Oil drain plug		
Sight glass	1 1/8"-18 UNEF	25 Nm
Flanged connection	M10	45 Nm
Soldering gland-shut-off valves		
Plugs	1/8" NPTF	25 Nm
Electromagnetic clutch	M12	85 Nm
Decompression valve	M24	100 Nm

¹⁾ With aluminium gasket

Spare parts list

Spare parts list

You can order individual items listed in this maintenance manual, with the corresponding item number, simply via our spare parts lists. You can view these at any time via our **Bock compressor selection programme „VAP“** (vap.bock.de) or our **spare parts catalogue BOCK shop** (bockshop.bock.de).



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